

Open Research Online

The Open University's repository of research publications and other research outputs

Networked learning environments

Book Section

How to cite:

Jones, Chris In: ed. Physical and Virtual Learning Spaces in Higher Education: Concepts for the Modern Learning Environment. Hershey, PA: IGI Global, pp. 102–118.

For guidance on citations see [FAQs](#).

© 2012 IGI Global

Version: Version of Record

Link(s) to article on publisher's website:

<http://www.igi-global.com/bookstore/titledetails.aspx?titleid=46984>

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

oro.open.ac.uk

Networked Learning Environments

Chris Jones,

Reader in the Institute of Educational Technology, The Open University, UK.

ABSTRACT

This chapter introduces the idea of networked learning environments and argues that these environments provide the totality of surrounding conditions for learning in digital networks. It provides illustrative vignettes of the ways that students appropriate networked environments for learning. The chapter then examines the notion of networked learning environments in relation to the idea of infrastructure and infrastructures for learning and sets out some issues arising from this perspective. The chapter suggests that students and teachers selectively constitute their own contexts and that design can only have an indirect effect on learning. The chapter goes on to argue that design needs to be located at the meso level of the institution and that a solution to the problem of indirect design lies in refocusing design at the meso level and on the design of infrastructures for learning.

INTRODUCTION

This chapter focuses on the idea of a learning environment from the perspective of networked learning. The term has been developed and defined in a number of publications and a series of international conferences and the definition of networked learning arising out of this tradition is that networked learning is:

learning in which information and communication technology ... is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources (Goodyear, Banks, Hodgson & McConnell, 2004, p. 1).

The central terms in this definition are *connections* and *information and communication technologies* because the interactions the definition points towards are human interactions but they include human interactions with materials and resources and interactions that are mediated through digital networks. In this definition interactions with materials and resources alone are insufficient and networked learning requires aspects of human-human interaction even when they are mediated through digital technologies. This definition of networked learning takes a relational stance in which learning takes place in relation to others and in relation to artifacts in the form of both communications media and learning resources.

The chapter argues that networked learning *environments* are critical for networked learning but that the environment is always selectively appropriated by students and tutors participating in it to make their own learning contexts. Environments are understood from this perspective in a straightforward way as the totality of surrounding conditions. The term learning environment points to the human, social, physical and virtual aspects of a setting, and the characteristics or arrangements of those elements of that setting, within which learning can take place. This definition is not restricted to the social environment and includes technological artifacts and the physical arrangements of things. Of course learning can take place anywhere and at any time and the idea of a learning environment implies that such settings are intentionally designed and arranged to allow learning to take place. Recently the debate about design has focused on the term Learning Design (Koper & Tattersall, 2005) which has at least two distinct meanings. The first more technical approach is often distinguished by the use of capital letters, Learning Design (LD), and the second usage in lower case refers to learning design in a more general sense. In this chapter

I argue for the use of the idea of indirect design for learning and by implication I dismiss the idea that learning design in either sense is an appropriate approach. Learning Design in the stronger sense of Learning Design (LD) arose out of the experience of the Open University in the Netherlands and its desire to reduce institutional complexity by developing a “pedagogical meta-language” (Koper & Tattersall, 2005, p. vii). Other approaches compete with Learning Design for attention as researchers search for ways to abstract general design principles, such as pedagogical design patterns (McAndrew, Goodyear & Dalziel, 2006) and scripts (Tchounikine, 2008). Beyond design the term learning environment is explored further in relation to recent usages within educational research literature. For example one use of the term learning environment would include the totality of resources on which the learner can draw. This view is found widely in educational literature and is particularly strongly associated with the relational or phenomenographic approach to learning (see for example Laurillard, 2002). Laurillard comments that:

The epistemological position ... requires a relational view of knowledge and of learning, and emphasizes the situated character of all learning. (Laurillard, 2002, p. 62)

To a large extent this is the position taken in this chapter with a small variation which is that I would separate the environment, the totality of surrounding conditions, from the context which I understand as being constituted in an active process by participants in the environment. For example, two students in an identical learning environment may make quite different contexts from the same set of resources according to their orientation and intentional engagement with the learning environment and consequently we regularly find students studying the same course interpreting, even well designed, assessment criteria in divergent ways (see for example Jones & Asensio, 2001).

NETWORKED LEARNING ENVIRONMENTS

Networked learning environments are the totality of surrounding conditions, *mediated by digital networks*, within which education or learning can take place. They may be composed of intentionally organized elements and in some cases elements that are specifically designed for learning but a networked learning environment can be composed of contingently arranged components that are drawn on for educational and learning purposes without themselves being the outcome of a design process. For the purposes of this chapter all networked learning environments include networked and digital technologies. A networked learning environment would include a school classroom incorporating computers and network connections, but it would also include an Internet café, a study bedroom and many largely informal settings. Within a university students move between a variety of environments and as networks extend to include mobile technologies many, if not all, of these environments become networked learning environments which allow access to a range of study materials, resources and organizational aids. In some ways as mobile communications develop it becomes increasingly difficult to leave a networked learning environment in network societies (Castells, 2000; Castells, Fernández-Ardèvol, Qiu, & Sey, 2007).

The assumption of network connectivity is no longer unusual but equally it is not yet universal and care needs to be taken to ensure some equality of access. It is becoming commonplace for surveys of students at university in the US, Australia and the UK to show high levels of ownership of networked devices including laptop computers and sophisticated mobile (cell) phones (Salaway, Caruso & Nelson, 2008, Kennedy, Judd, Churchward, Gray & Krause, 2008, Jones, Ramanau, Cross & Healing, 2010). Even in these countries ownership and access to networked computing is not universal and in developing countries the evidence is that network access is still restricted, even though students are prepared to make exceptional efforts to obtain access (Czerniewicz, Williams & Brown, 2009). A central question for the design of learning spaces in Higher Education is how these learning environments, infused with networked and digital technologies are being inhabited by students. The next section examines one popularized approach to the relationship between young students and technology, the Net Generation and Digital Natives debate.

Technological Impacts and Student Agency

The following section examines a widely referenced set of ideas using the terms Net Generation and Digital Natives (see for example Tapscott 1998 & 2009; Palfrey & Gasser, 2008, Oblinger & Oblinger, 2005). The idea of a Net Generation and Digital Natives suggest that because young people have grown up in a world infused with networked and digital technologies there has been a clear impact, in terms of attitudes and orientation to learning, on an entire generation of young people, many of whom are now students at university. This set of ideas has a strongly determinist essence in which young people's ideas and attitudes are affected as a whole by the introduction of new technologies. This view of the new generation of students has been qualified by recent empirical research and by theoretical work questioning the terms in which the Net Generation and Digital Natives debate has taken place (see for example Kennedy et al., 2008; Bennett, Maton & Kervin, 2008; Jones et al., 2010). The recent empirical work points to two key features of new students entering university. Firstly there are age related differences amongst students, even within the Net Generation age group. Secondly that these differences cannot be smoothed into a single generational shift and they remain complex and related to specific contextual factors including student choice, gender, institutional mode (distance or place-based) and design. The newer critical work on the Net Generation and Digital Natives suggests we should be cautious about generalizing to an entire generation of students and points to the existence of variations within Net Generation age students and to the agency of students in negotiating their engagement with new technologies (Jones et al., 2010, Czerniewicz, 2009).

In the spring of 2009, as part of a research project investigating first year students, 18 students at four English Universities were asked to respond to text messages over a 24 hour period. This intervention was based on the Day Experience Method (Riddle & Arnold, 2007). The project team also interviewed 58 students in the winter of 2008 and spring of 2009. Drawing from the interviews, and from the students own reports from the Day Experience intervention, a picture emerged of the kinds of contexts that students constituted in the learning environments supplied by universities. Such a picture contrasts with and complements the literature that has grown up describing Net Generation or Digital Native students. We have drawn two illustrative vignettes from our research and whilst not fully representative, they are included to illustrate the potential variety of students' engagements with current technologies. They provide accounts of how students actively make use of the environments, both the physical spaces and the networked ones, to constitute their own contexts.

1. A young 'Net Generation' place-based student

Beth is a young student studying a science based course. Like many students she balances a busy social life that includes sport and a range of leisure activities with academic work. Her study room is a comfortable space with a range of technologies at hand including a laptop computer and a mobile phone. The day moves between different spaces but often within the confines of this room. Arrangements are made on Facebook for sports activities and email is checked for both study and social purposes. The Virtual Learning Environment (VLE) is accessed at the end of a sequence of activities that, despite being a first year student, is already described as a habit that moves from social activities in towards her work.

Right, I've just flicked on to the internet and I'm just checking my Tiscali e-mails which is the first thing I usually do and see whether anybody interesting has bothered to contact me. Usually there are only Facebook notifications - looks as though there is one from my football team which means I probably will actually go on to Facebook which is never a good idea to see what all that's about. I usually follow the same thing each day, I log on to my Tiscali e-mail see whether anything interesting is on there, usually there isn't. Then I go on to BBC sport because I'm a bit of a sport addict and see what's happening there. Then I check my [University] student e-mails because there's usually a lot more going on there. That could be if there is any lecture changes or exam results out that I need to be aware of. Then I log into [local VLE] and the lecture writing up begins.

This is the portal home page, got all sorts of stuff on that, my e-mail, [local VLE] my life saver, random announcements that may be of interest to us, not really. Here's [local VLE], if it wasn't for this it would be so difficult because I'd be scrambling down notes in my lectures and I really wouldn't be paying much attention. So thanks for this, it's an absolute life saver.

I think I've missed the last couple of texts, I've been far too busy playing football need a good respite from all of this hard work. I think I left to go to football at about quarter to seven and I've just got back at quarter past nine, so back to the hard work, I've got to continue with the lecture I was doing earlier. If there is anything.. I need back up I need to actually look that up on the Internet, I just need to look up a few definitions...

A mature student place-based student

Helen is a busy Mum. She moves from university to home and then picks up the children. Her early evening is full of domestic work and engagement with her children while they use their own technologies, mainly games. Later in the evening when the children have gone to bed she begins to work in a corner of a domestic room that is equipped with a laptop computer and a desk. Work goes on for a couple of hours before bed and includes working online as well as reading for the next day's classes. In the morning Helen goes to the lecture theatre early after dropping the children off and works on her laptop online until the lecture theatre fills up for the first class.

It's just gone seven o'clock and I've just turned on the laptop ready to start some work. The children are busy on Nintendo DS's. Ok we'll talk again later...

Hi the time now is 20.16 and I've just started work on my CV. The children have now gone to bed so there should be peace and quiet.

Hi its me, I'm still working on my CV the time now is nine o'clock and now I'm getting tired. [Camera moves around the room showing books on a shelf to the left and the laptop in front. As the camera pans right the scene moves from a work station to a living room in dim light with a TV turned on to the rear of the workstation without sound]

Not much has changed from before, still working.

As you can see the fish are going to sleep, it's very quiet. I don't think you can see the dragon who's fast asleep. The television is off, the Wii is off, and I'm still in my corner on the computer. Just put all the washing to dry, made a cup of coffee, and going to start my next lot of work. Everybody else has left me, so I'm very tired now, bye.

The time is now 23.15 ...as you can see [laptop screen showing graphs and data] I'm working on cinema attendances and I'm very, very tired now and I'm going to bed in a moment.

These two vignettes point towards the way students actively engage with technologies, in relation to their learning, within the overall pattern of their lives. There is no sense that the technology imposes itself on the user or that the technology can be considered alone. The student is faced with a learning 'landscape', that consists of organizational and institutional requirements, academic interests, social and leisure activities, etc within which the technological tools and services sit. The technologies form just one part of this landscape in which students selectively appropriate different elements they consider appropriate for their learning. When the students use their laptop it is as a multi-functional device that facilitates a variety of activities and social engagements from which the students choose to constitute their own personal repertoire of activity.

Students from the same course and university manage their environments in notably different ways. For example consider these two computing students studying at the same university:

B: I prefer to work in the lab because the software is there and everything's working. So it's easier for me that way.

Interviewer: And your choice was?

C: I kind of prefer to do it in my room because in the labs there's certain things you can't do and on your own computer you can.

Both students were studying the same computing course and confirmed that they had different working practices based on considerations of reliability and a lack of distraction in the first case (B) and greater

control over what can be done in the second (C). Later in the same interview the same two students contrasted their use of cut and paste for programming:

C: ... I use quite a lot of online books because if I do code ... if you have a book on paper you have to copy the code in, type it in yourself.

Interviewer: You have to retype it, yeah?

C: But then if you make like one mistake, if you like miss out a dot or something, it messes up and you can't understand why. But if they provide you with an example on the Internet and you copy and paste and then you know it works because it's exactly what they give you, if you know what I mean.

B: I prefer to do both. I like the books because it's something you can read. When I type it and if I get it wrong after a couple of attempts I'll just go to the website and copy the exact same code but I prefer to type it because it's like a learning process isn't it.

Clearly these students even when studying under the same conditions general conditions still engaged in significantly different practices which accorded with a largely personal selection from the learning environment.

A commonly made comment from the students during de-briefing following the Day Experience intervention was how it had drawn attention to technologies that they used but usually didn't consider. For example:

I found it quite interesting like getting the text and then having to record what I'm doing and trying to identify what technology I'm actually using... and in parts I thought 'what technology am I actually using?', it turned out I was using more than I thought and how much it's incorporated into my everyday life without me even realising it ... it was quite surprising. (Accounting student Day Experience De-briefing group interview)

This was most remarked on in relation to the mobile (cell) phone but it applied to other technologies too. It suggests that technology is becoming naturalized such that students are less aware of the technologies themselves and have to be prompted to notice them (JISC, 2007).

Networked Learning Environments and Infrastructure

The way that the technology fades into the background suggests that many of the elements that compose a networked learning environment fit the traditional conception of an infrastructure as something that is already in place, ready-to-use, completely transparent and not requiring consideration. Infrastructure though often out of sight comes into sharp focus when it fails. Infrastructure can be thought of simply as an object, something that is built and maintained and then sinks into the background becoming almost invisible. Edwards (2003) describes infrastructures as socio-technical systems, which are reliant on complex organizational practices for maintenance and for making the infrastructure meaningful in practice. In networked learning digital technologies are integrated into social structures and practices and these structures and practices are rapidly becoming naturalized for both teaching staff and students. Technological infrastructures in tertiary education now reach well beyond particular tasks and processes and there are development programs aimed at both staff and students intended to make the networked learning infrastructure an integral part of university practices. The installed base of networked technologies in universities has now been in place for many years and it is part of a process of continuous renewal. For many staff and students it is the experience of a sudden or unexpected breakdown of the

standard technologies that makes it clear just how much networked and digital technologies now form part of a widespread infrastructure in university education.

The general conception of an infrastructure has been developed with a specific focus on learning (Guribye 2005; Guribye & Lindström, 2009).

An infrastructure for learning is a set of resources and arrangements – social, institutional, technical – that are designed to and / or assigned to support a learning practice. (Guribye & Lindström, 2009)

Elsewhere Guribye points out that infrastructures for learning do not have to be designed by the users for specific tasks and might commonly be designed by a variety of actors (Guribye, 2005, pp. 63 & 64). Guribye's approach is a useful way to examine those internal infrastructures that form part of the learning environment as it is experienced by students. It is also useful for considering the way infrastructures influence the teaching environment experienced by academic staff. However caution needs to be exercised because this approach explicitly excludes those areas that are neither designed for nor specifically assigned to support learning but which are arguably of central importance in networked learning environments (Jones, 2009). Examples of this are the routine use of Google as the search engine of choice by both students and academics and the use of Wikipedia for quick answers, even when this is officially frowned upon within the university. Currently services such as Facebook, You Tube and iTunes are being integrated into educational institutions, and student learning practices, but they are still largely outside institutional control. Universal services such as You Tube and iTunes now have institutional aspects and the Open University (UK) has, for example, launched an iTunes U service in June 2008 (<http://www.open.ac.uk/itunes/>) and materials are also available via a YouTube channel (<http://uk.youtube.com/theopenuniversity>).

Universities will have to make choices about the relationship they have to universal services. They may find that they cannot easily rely on external systems and services because they depend on decisions taken elsewhere and because these systems and services can be unilaterally withdrawn or altered by their suppliers. Externally supplied systems and services may not comply with university regulations, such as those in relation to access for students and staff with disabilities. The need for an institutional 'backbone' is related to one of the core functions of a university which is to provide credentials and to stand behind those credentials by having warranted procedures (Brown & Duguid, 2000). In this context decisions about the boundaries of institutional provision have to be made by universities between two forces that are in tension. Firstly there is a need for infrastructures for learning and the provision of 'quality assured' safe areas in which media and technologies are under institutional control. Secondly there is a need to incorporate and manage the universal service infrastructures, such as Google, Wikipedia and social networking sites, which routinely breach institutional boundaries.

Networked Learning and Virtual Learning Environments

The area of institutionally bounded infrastructures for learning, and the provision of quality assured areas, concerns the provision of technologies such as virtual or managed learning environments (VLE), which are strongly identified with commercial products and open source software (often known outside the UK as Learning or Course Management Systems e.g. Blackboard, Moodle etc).

Virtual learning environments (VLEs) are learning management software systems that synthesise the functionality of computer-mediated communication software and on-line methods of delivering course materials (Britain & Liber, 1999, p. 3).

The use of VLEs in UK universities has developed in the last ten years in ways that have emphasized the management aspects of online learning environments with the integration of a variety of administrative

and organizational features. Weller places the VLE at the heart of a complex process of change that has surrounded the term e-learning:

...underlying all of these activities is the environment in which e-learning takes place, the VLE or LMS... The pedagogical, political, technical and economic arguments that pervade e-learning are reflected in the choice, deployment and development of a VLE in an organization. (Weller, 2007, p. 1)

Weller defines a VLE, like Britain and Liber as a software system that combines a number of different tools that are used systematically to deliver content online but he adds that a VLE also facilitates the learning experience around that content (Weller, 2007, p. 5). The VLE in both definitions includes aspects of delivery and of communication with the latter being clearly identified by Weller as enabling facilitation of learning around content.

The development and deployment of VLEs in place-based universities has shifted debate away from the 'virtual' university to the ways in which networked and digital technologies interpenetrate physical learning spaces.

The enhancement of face-to-face teaching with the use of CITs (sic) [Communication and Information Technologies] represents a shift from campus-bound activities, enabling increased flexibility over when, where, what, how and with whom students learn... In this context, what types of built environments are universities offering students? (Jamieson, Taylor, Fisher, Trevitt & Gilding, 2000, p. 221)

Crook used the term learning 'nests' to describe the student study bedroom equipped with networked computers (Crook, 2002). He noted how the term learning nests caught on, perhaps because it implied a cosy, personalized space that was still connected to a larger world. Crook also commented that the feature that distinguishes networked learning from "mere 'electronic learning' is the promise of interpersonal communication" (Crook, 2002, p. 296). Other authors have also noted that we should expect students to customize designed learning spaces and make their own "local habitations" (Nardi & O'Day, 1999). The tension built into Virtual Learning Environments and the emergent study bedroom setting is one between networks as sources of delivery and networks as conduits for communication. Weller dubs these two views the broadcast and discussion viewpoints (Weller, 2007, p. 6) and it clearly relates to the much broader and philosophically inspired debate between transmission models of learning and participative models. Sfard, 1998 for example has discussed these issues in terms of two metaphors for learning and argued that there is a danger in just choosing one. The contrast Sfard makes is between what she calls an 'acquisition' metaphor and a 'participation' metaphor but like Weller she argues that the metaphors are not mutually exclusive and that strength lies in combining the two perspectives rather than relying on one.

The institutional location of VLEs suggest that they need to be understood as being at intermediate levels of scale, somewhere between macro and micro levels of the environment, i.e. at the meso level (see Mouzelis 1995; Sibeon, 2004; Jones, Dirckinck-Holmfeld & Lindström, 2006). Embedded at an institutional level a VLE is neither a small-scale self-contained learning environment, nor does it encompass a totality of resources, sitting as it does within a broader learning environment that would include a range of externally designed and supplied elements, for example iTunesU and YouTube. The nature of the VLE also suggests that it needs to be understood as an infrastructure rather than as a technology or tool. Infrastructure, as noted above, suggesting something that is already in place and immediately available for use, readily understood and requiring little thought. In other contexts infrastructure would apply to the water system, the electricity supply, the railway, the mail services and more recently the Internet.

Issues Arising from Networked Learning Environments

The concept of a networked learning environment suggests that the technological and physical environment is best understood as intertwining and constantly interacting with the social organization of the setting. It also points towards the socially and physically networked nature of learning environments that are distributed over both space and time. The introduction of digital and networked technologies has generated a number of issues concerning their impact on learning environments which include:

- Time shifts - Computer networks used in education affect the usual time patterns of education. Many courses delivered across networks are asynchronous.
- Place - The introduction of mobile and ubiquitous computing devices have begun to make the idea of education occurring at anytime, anyplace, and anywhere seem more feasible.
- Digital preservation - The outputs of synchronous and asynchronous activity are easily preserved in transcripts, logs and a variety of other forms including the archiving of web casts and audio interviews/podcasts.
- Public/Private boundaries - The preservation of what would otherwise be ephemeral materials alters the boundaries between what is public and what is private. Tutors can now view and preserve the details of student's interactions during group activities, making these available as tools for assessment.
- Forms of literacy - The still largely text based world of networked learning has generated new forms of writing that are neither simple text replications of informal conversation nor are they formal written texts. The integration of images and audio into digital environments has suggested new forms of multimedia literacy.
- Content – The boundary between content and process is shifting. Blogs and wikis can provide elements of content and cut and paste re-use is common practice. The idea that there is a clear distinction between activity/process and artefact/content is becoming strained. (Jones & Dirckinck-Holmfeld, 2009, p. 13)

Participants in a computer network whilst they are simultaneously situated at a real point in time and space are also displaced from that physical point in a virtual space configured through the network. In contrast Hine (2000) points out that despite the generic nature of Internet spaces the local is very much embedded in particular uses of the Internet, e.g., homepages or social networking site profiles such as those on Bebo, Facebook and MySpace. People using network spaces are never completely disembedded or separated from their off-line activities and spatial locations. Rather offline spaces interpenetrate online netscapes and together they configure new hybrid forms. Moreover the properties of space as experienced offline are used to inform the design of online environments. Overall the standpoint taken in this chapter is that computer networks disrupt and disturb traditional boundaries in education. If this is so then it is important to consider how this might affect the parameters of design.

Solutions and Recommendations: Contexts for Learning and Indirect Design

Networked learning environments disrupt traditional boundaries and place the emphasis for designers in different parts of the environment. A networked learning environment rekindles disputes between individual and social perspectives on learning with advocates of the VLE pitching themselves against advocates of personal learning environments (Weller, 2007; Sclater & Weller, 2009). Networked learning environments also disrupt institutional boundaries with advocates of Web 2.0 technologies suggesting that VLEs perpetuate a 'walled garden' of provision when the new technologies that are becoming available allow for a wider variety of provision and for services to be sourced from outside the academy (Jones, 2008). This kind of thinking is only enhanced by the current shift in emphasis towards cloud computing and a number of universities in the UK, including the Open University, are currently shifting some of their institutional provision of services to Google apps and placing them, at least partially, outside the institution.

I have argued that networked learning environments are composed of the totality of resources and that contexts for learning are constituted from this totality selectively by students and teachers acting in ways that are informed by their own histories, purposes and intentions. In relation to design I argue that as a consequence of this selective appropriation of the learning environment learning itself can never be directly designed, only designed *for* (i.e. planned in advance) (see Beetham & Sharpe, 2007). Learning itself is only indirectly related to our activities, communities and places and these in turn are indirectly related to those aspects that can be designed and planned. The tasks, spaces and organizations that we design rely on being inhabited by the teachers and learners who will ‘enact’ our designs. Goodyear has summarized these distinctions as an indirect approach to learning and their relationships are shown in Figure 2

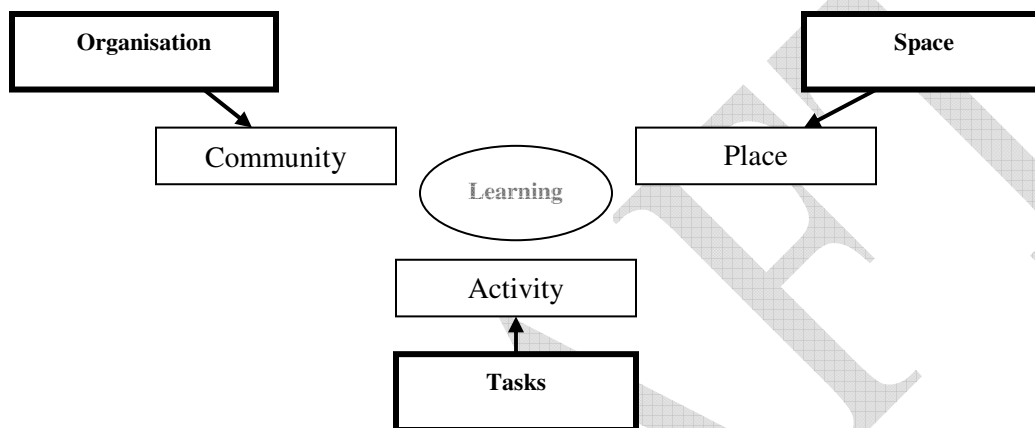


Figure 1. Indirect approach to learning (Goodyear, Jones, Asensio, Hodgson & Steeples, 2001)

In a networked learning environment place and space become highly contingent factors as I have illustrated in relation to students learning nests and the vignettes derived from our research. As a consequence place and space require detailed attention in terms of the design of all types of learning environments that are affected by digital networks, whether learners are co-located, distant or in a combination of the two (see, for example, Goodyear et al., 2001).

The first suggestion for design is to focus further away from the learning in networked learning environments and to concentrate on designing those aspects of the learning environment that are clearly under the designers control such as organization, space and task. Given what I have also argued about the way new technologies form a netscape, that is a composite of various technologies aggregated in services and accessed through particular devices, it also suggests that a focus for design should be on meso level features such as infrastructures and infrastructures for learning rather than on the particular practices, tools and services situated at a micro level of activity.

FUTURE RESEARCH DIRECTIONS

Networked learning environments are becoming the basis of much university education in the advanced industrial countries and even more broadly as networked technologies inform and infuse many aspects of the world. I would argue that to understand the changes in learning environments that are continuing to disrupt traditional patterns of learning we need to understand learning infrastructures rather better. Educational research has a tendency to focus on either micro level activity by teachers and learners or on broad social and policy issues that occur at the macro levels of national or regional political policy and broad, even global social and technological changes. The arguments presented here suggest that the focus

should be at the meso level of institutional and collective agency in which departments, faculties, schools and universities act to develop and provide the infrastructures and environments for learning that students and academic staff then inhabit and enliven with their activities. Furthermore the shift from place-based forms of organization to a more networked form based more closely on person-to-person ties requires the development of new ways of thinking about the organization of learning.

Networked and complex internetworked forms of organization signal a shift away from space and locality to more networked forms. Part of this shift is towards networked individualism, the move from place-to-place to person-to-person forms of organization (Castells, 2000). However caution needs to be exercised in interpreting the idea of the person not to slide into a form of methodological reduction and the diminution of social forms into aggregates of individuals. For example research should explore whether designers respond to networked individualism by the development of Personal Learning Environments (PLE). Weller has noted that personalisation can be interpreted as either the personalisation of information or the personalisation of tools and services (Weller, 2007, p. 111). It is the second view that links to the suggestion that design needs to consider the institutional and infrastructural level.

The idea behind a PLE is that users amass or create a collection of tools for themselves, which constitute their own learning environment... The PLE provides a way of linking these together for the user and then integrating them with institutional systems (Weller, 2007, p. 114).

Research will need to examine the ways in which new network forms relate to institutional boundaries and whether greater personalisation will lead to the disaggregation of university functions or to a new integration with networked technologies finding a place within institutional forms whilst allowing for greater personalisation.

Weller notes four downsides to the concept of a PLE and these also suggest topics for future research in this area:

- Commonality of experience. PLEs may threaten or loosen the shared experience of studying a course.
- Exposure to different approaches. The educational gain of broadening a local and personal experience may be lost. PLEs may encourage a narrow private view that is resistant to change and encourage a 'customer' focus that relies on consumer choice of 'educational goods' that are often not appreciated until after the educational experience has taken place.
- Privacy. Personalisation requires the collection of user data and raises serious concerns in terms of privacy and surveillance. It may also have unintended consequences as once it is known that a system is monitored, user behaviour will adapt to the perceived requirements of the monitoring.
- Content focus. The drive behind PLEs is one that emphasises delivery of personalised content at the expense of communication with others

The PLE is one current design area that is closely related to the idea of networked individualism. However networked learning may offer an alternative vision to personalization, a vision of the social potential of learning environments infused with digital and networked technologies. The same technological forms that afford an enhanced personalization also emphasize connectivity and suggest new networked social forms that contrast with notions of community (Wittel, 2001). Network forms of organization can enable both the strong ties that are found in collaboration and community and the weak links found in looser more networked forms of organization.

CONCLUSION

This chapter has touched on a current debate in education about what might be called the limits of design. This chapter should be read in this context as an acceptance that design is an appropriate activity in networked learning, even if I have argued against the approaches that come under the banner of learning

design in both its forms. All of the mentioned approaches to design illustrate the challenges that are arising in higher education with the disruption caused by the introduction of networked and digital technologies on a broad scale. One of the most pressing problems that remains is to work out how a systematic design approach can be applied to the highly idiosyncratic and personalised practices of learning in higher education.

The chapter has also argued that design should shift focus towards institutional and infrastructural aspects of the networked learning environment. This implies that both research and design need to change focus to a different level of granularity, away from the detailed practices that occur at micro level of classroom interaction and equally away from the macro level technology and policy issues that provide the framework within which networked learning environments are developed. The appeal is for a focus on the meso level of learning characterised as residing at an institutional level of scale and open to design interventions at a collective rather than an individual level. The suggestion is that infrastructure for learning at a whole institution level should be one focus of attention, in the form of the design of VLEs and PLEs and that smaller units such as Departments, Faculties and Schools should provide another level of focus in the development of procedures and patterns of local practices.

Students already inhabit networked learning environments when they arrive at university. They bring with them habits of social engagement that are already mediated by digital networks. At university students engage with the institutional infrastructure for learning and within that designed elements of networked and e-learning. As mobile technologies become increasingly available students will construct their learning environment away from the buildings and settings that have been purposely designed for learning. The lecture theatre, seminar room and library will remain in use but they will be inhabited in different ways by students who can interact during face-to-face classes using networked devices. The library which can now be accessed from anywhere using the network will become less place-based and more of a network service available at all times from anywhere with network access. While these technological shifts are possible they are not inevitable and students cannot be simply described as a new Net Generation of Digital Natives. The task remains to find suitable ways to introduce design features into networked learning environments without prescribing the kinds of detailed interactions that teachers and learners undertake in these settings.

REFERENCES

- Beetham, H., & Sharpe, R. (Eds.). (2007). *Rethinking pedagogy for a digital age: Designing and delivering e-learning*. London, UK: Routledge Falmer.
- Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: A critical review of the evidence. *British Journal of Educational Technology*, 39(5), 775–786.
- Britain, S., & Liber, O. (1999). *A framework for pedagogical evaluation of virtual learning environments*. Retrieved March 30, 2010, from :
- Brown, J. S., & Duguid, P. (2000). *The social life of information*. Boston, MA: Harvard Business School.
- Castells, M. (2000). *The rise of the network society* (2nd ed.). Oxford, UK: Blackwell.
- Castells, M., Fernández-Ardèvol, M., Qiu, J. L., & Sey, A. (2007). *Mobile communication and society: A global perspective*. Cambridge, MA: MIT Press.
- Crook, C. (2002). The campus experience of networked learning. In C. Steeples & C. Jones (Eds.), *Networked learning: Perspectives and issues* (pp. 293-308). London, UK: Springer.

Czerniewicz, L., Williams, K., & Brown, C. (2009). Students make a plan: Understanding student agency in constraining conditions. *ALT-J*, 17(2), 75–88.

Dirckinck-Holmfeld, L., Jones, C., & Lindström, B. (2009). *Analysing networked learning practices in higher education and continuing professional development*. Rotterdam, The Netherlands: Sense Publishers B.V.

Edwards, P.N. (2003). Infrastructure and modernity: Force, time, and social organization in the history of sociotechnical systems. In T. J. Misa, P. Brey, & A. Feenberg (Eds.), *Modernity and technology* (pp. 185–225). Cambridge, MA: MIT Press.

Goodyear, P., Jones, C., Asensio, M., Hodgson, V., & Steeples, C. (2001). *Effective networked learning in higher education: Notes and guidelines*. Lancaster, UK: CSALT, Lancaster University. Retrieved April 10, 2011, from <http://csalt.lancs.ac.uk/jisc/>

Goodyear, P., Banks, S., Hodgson, V., & McConnell, D. (2004). *Advances in research on networked learning*. Dordrecht, The Netherlands: Kluwer.

Guribye, F. (2005). *Infrastructures for learning - ethnographic inquiries into the social and technical conditions of education and training*. Doctoral Thesis, University of Bergen, Norway. Retrieved April 10, 2011, from <http://hdl.handle.net/1956/859>

Guribye, F., & Lindström, B. (2009). Infrastructures for learning and networked tools - The introduction of a new tool in an inter-organisational network. In L. Dirckinck-Holmfeld, C. Jones, & B. Lindström (Eds.), *Analysing networked learning practices in higher education and continuing professional development* (pp. 103–116). Rotterdam, The Netherlands: Sense Publishers.

Hine, C. (2000). *Virtual ethnography*. London, UK: SAGE Publications Ltd.

Jamieson, P., Taylor, P., Fisher, K., Trevitt, A. C. F., & Gilding, T. (2000). Place and space in the design of new learning environments. *Higher Education Research & Development*, 19(2), 221 – 236

JISC. (2007). *Student expectations study: Key findings from online research*. Discussion evenings held in June 2007 for the Joint Information Systems Committee. London, UK: JISC. Retrieved April 10, 2011, from <http://www.jisc.ac.uk/publications/publications/studentexpectations>

Jones, C., & Asensio, M. (2001). Experiences of assessment: using phenomenography for evaluation. *Journal of Computer Assisted Learning*, 17(3), 314–321.

Jones, C., Dirckinck-Holmfeld, L., & Lindström, B. (2006). A relational, indirect, meso-level approach to cscl design in the next decade. *International Journal of Computer-Supported Collaborative Learning*, 1(1), 35–56.

Jones, C. (2008). Infrastructures, institutions and networked learning. In V. Hodgson, C. Jones, T. Kargidis, D. McConnell, S. Retalis, D. Stamatis, & M. Zenios (Eds.), *Proceedings of the Sixth International Conference on Networked Learning 2008*. Lancaster, UK: Lancaster University.

Jones, C. (2009). A context for collaboration: The institutional selection of an infrastructure for learning. In C. O'Malley, D. Suthers, P. Reimann, & A. Dimitracopoulou (Eds.), *Proceedings of the 8th*

International Conference on Computer Supported Collaborative Learning Practices (CSCL2009). Rhodes, Greece: Lulu.com.

Jones, C., & Dirckinck-Holmfeld, L. (2009). Analysing networked learning practices: An introduction. In L. Dirckinck-Holmfeld, C. Jones & B. Lindström (Eds.), *Analysing networked learning practices in higher education and continuing professional development* (pp. 1-28). Rotterdam, The Netherlands: Sense Publishers B.V.

Jones, C., Ramanau, R., Cross, S. J., & Healing, G. (2010). Net generation or digital natives: Is there a distinct new generation entering university? *Computers & Education*, 54(3), 722–732.

Kennedy, G., Judd, T. S., Churchward, A., Gray, K., & Krause, K. (2008). First year students' experiences with technology: Are they really digital natives? Questioning the net generation: A collaborative project in Australian higher education. *Australasian Journal of Educational Technology*, 24(1), 108-122. Retrieved April 20, 2009, from <http://www.ascilite.org.au/ajet/ajet24/kennedy.html>

Koper, R., & Tattersall, C. (Eds.). (2005). *Learning design: A handbook on modeling and delivering networked education and training*. Berlin, Germany: Springer.

Laurillard, D. (2002). *Rethinking university teaching: A conversational framework for the effective use of learning technologies* (2nd ed.). London, UK: Routledge Falmer.

McAndrew, P., Goodyear, P., & Dalziel, J. (2006). Patterns, designs and activities: Unifying descriptions of learning structures. *International Journal of Learning Technology*, 2(2–3), 216–242.

Mouzelis, N. (1995). *Sociological theory: What went wrong?* New York, NY: Routledge.

Nardi, B., & O'Day, V. (1999). *Information ecologies: Using technology with heart*. Cambridge, MA: MIT Press.

Oblinger, D. G., & Oblinger, J. L. (2005). *Educating the Net generation, an Educause e-book*. Retrieved April 10, 2011, from <http://www.educause.edu/ir/library/pdf/pub7101.pdf>

Palfrey, J., & Gasser, U. (2008). *Born digital: Understanding the first generation of digital natives*. New York, NY: Basic Books.

Riddle, M., & Arnold, M. (2007). *The day experience method: A resource kit*. Retrieved April 10, 2011, from http://www.matthewriddle.com/papers/Day_Experience_Resource_Kit.pdf

Salaway, G., Caruso, J. B., & Nelson, M. R. (2008). The ECAR study of undergraduate students and Information Technology, 2008. Research study (vol. 8). Boulder, CO: EDUCAUSE. Retrieved April 10, 2011, from <http://www.educause.edu/ecar>

Sclater, N., & Weller, M. (2009). *Podcast for H800 Technology-enhanced learning: Practices and debates*. Retrieved April 11, 2011 from http://nogoodreason.typepad.co.uk/no_good_reason/2009/04/vle-vs-ple-fight-club.html

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, 27(2), 4-13

Sibeon, R. (2004). *Rethinking social theory*. London, UK: Sage publications.

Tapscott, D. (1998). *Growing up digital: The rise of the Net generation*. New York, NY: McGraw-Hill.

Tapscott, D. (2009). *Grown up digital: How the Net generation is changing your world*. New York, NY: McGraw-Hill.

Tchounikine, P. (2008). Operationalising macro-scripts in CSCL technological settings. *International Journal of Computer Supported Collaborative Learning*, 3(2), 193–233.

Weller, M. (2007). *Virtual learning environments: Using, choosing and developing your VLE*. London, UK: Routledge.

Wittel, A. (2001). Towards a network sociality. *Theory, Culture and Society*, 18(6), 51-76.

ADDITIONAL READING SECTION

Bielaczyc, K. (2001). Designing social infrastructure: The challenge of building computer-supported learning communities. In P. Dillenbourg, A. Eurelings & K. Hakkarainen (Eds.), *European perspectives on computer-supported collaborative learning. The proceedings of the First European Conference on Computer-Supported Collaborative Learning* (pp. 106-114). University of Maastricht.

Bielaczyc, K. (2006). Designing social infrastructure: Critical issues in creating learning environments with technology. *The Journal of the Learning Sciences*, 15 (3), 301 – 329

Britain, S. (2004). *A review of learning design: Concept, specifications and tools*. A report for the JISC E-learning Pedagogy Programme. Retrieved April 11, 2011, from http://www.jisc.ac.uk/uploaded_documents/ACF83C.doc

Brown, C., & Czerniewicz, L. (2008, September). *Trends in student use of ICTs in higher education in South Africa*. Paper presented at the 10th Annual Conference of WWW Applications, Cape Town, SA. Retrieved April 11, 2011, from http://www.cet.uct.ac.za/files/file/ResearchOutput/2008_wwwApps_UseTrends.pdf

Brown, J. S., & Duguid, P. (2001). Knowledge and organization: A social-practice perspective. *Organization Science*, 12(2), 198–213.

Brown, J. S. (2006). New learning environments for the 21st century: Exploring the edge. *Change*, 38(5), 18–24.

Cornford, J. (2000). The Virtual University is ... the University made Concrete? *Information, Communication and Society*, 3(4), 508-525.

Edwards, P. N., Jackson, S. J., Bowker, G. C., & Knobel, C. P. (2007, January). *Understanding infrastructure: Dynamics, tensions and design*. Report of a workshop on History & theory of Infrastructure: Lessons for New Scientific Cyberinfrastructures. NSF and University of Michigan. Retrieved April 11, 2011, from <http://pne.people.si.umich.edu/PDF/ui.pdf>

Hanseth, O., & Lundberg, N. (2001). Designing work oriented infrastructures. *Computer Supported Cooperative Work*, 10, 347-372.

- Harrison, S., & Dourish, P. (1996). Re-place-ing space: The roles of space and place in collaborative systems. In *Proceedings of CSCW 96* (pp. 67-76). New York, NY: ACM.
- Hemmi, A., Bayne, S., & Land, R. (2009). The appropriation and repurposing of social technologies in higher education. *Journal of Computer Assisted Learning*, 25, 19 -30.
- Jones, C. (2004). Networks and learning: communities, practices and the metaphor of networks. *ALT-J, The Association for Learning Technology Journal*, 12(1), 82-93
- Jones, C., Ferreday, D., & Hodgson, V. (2008). Networked learning a relational approach – weak and strong ties. *Journal of Computer Assisted Learning special section*, 24(2), 90–102.
- Kapur, M., Hung, D., Jacobson, M., Voiklis, J., Kinzer, C., & Chen, D-T (V). (2007). Emergence of learning in computer-supported, large-scale collective dynamics: A research agenda. In C. A. Clark, G. Erkens & S. Puntambekar (Eds.), *Proceedings of the International Conference of Computer-Supported Collaborative Learning* (pp. 323-332). Mahwah, NJ:Erlbaum.
- Lakkala, M., Paavola, S., & Hakkarainen, K. (2008). Designing pedagogical infrastructures in university courses for technology-enhanced collaborative inquiry. *Research and Practice in Technology Enhanced Learning*. 3 (1) pp 33 – 64.
- Lash, S. (2001). Technological forms of life. *Theory, Culture & Society*, 18(1), 105-120.
- Liljenström, H., & Svedin, U. (Eds.). (2005). *Micro, meso, macro: Addressing complex systems*. London: World Scientific Publishers.
- Ryberg, T., & Larsen, M. C. (2008). Networked identities: Understanding relationships between weak and strong ties in networked environments. *Journal of Computer Assisted Learning special section*, 24(2), 103–115.
- Schatzki, T. R., Knorr Cetina, K., & Von Savigny, E. (Eds.). (2001). *The practice turn in contemporary theory*. London: Routledge.
- Sclater, N. (2008). Large-Scale Open Source E-Learning Systems at the Open University UK. *Educause Centre for Applied Research Research Bulletin* Issue 12. Boulder, CO: Centre for Applied Research. Retrieved April 10, 2011, from: <http://www.educause.edu/ecar>
- Sclater, N. (2008a). Web 2.0, Personal Learning Environments and the Future of Learning Management Systems. *Educause Centre for Applied Research Research Bulletin* Issue 13. Boulder, CO: Centre for Applied Research. Retrieved April 10, 2011, from: <http://www.educause.edu/ecar>
- Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research*, 7(1), 111-134.
- Steeple, C., & Jones, C. (Eds.). (2002). *Networked learning; perspectives and issues*. London: Springer Verlag.
- Weller, M., & Daziel, J. (2007). Bridging the gap between web 2.0 and higher education. *Proceedings of the 2nd International LAMS conference, Sydney*. Retrieved April 10, 2011, from <http://lams2007sydney.lamsfoundation.org/pdfs/04g.pdf>

Wellman, B., Quan-Haase, A., Boase, J., Chen, W., Hampton, K., Isla de Diaz, I., et al. (2003). The social affordances of the internet for networked individualism. *JCMC*, 8(3). Retrieved April 10, 2011, from <http://jcmc.indiana.edu/issues.html>

KEY TERMS & DEFINITIONS

Networked Learning: learning in which information and communication technology is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources

Learning environment: the human, social, physical and virtual aspects of a setting, and the characteristics and arrangements of those elements, within which learning can take place.

Networked Learning Environment: the totality of surrounding conditions, mediated by digital networks, within which education or learning can take place.

Context: the active constitution of an understanding of the available elements in an environment by an agent acting for a purpose

Learning context: The constituted understanding by an agent of an environment for the purpose of learning

Design for learning: the process by which those interested in the support of learning, plan, structure or design environments to enable or allow for learning.

Indirect design: the process of designing those aspects of a learning environment open to design (organization, space and tasks) and expecting these features to be enacted by learners and teachers (in communities, places and activities) and understanding that these enacted contexts are themselves only loosely related to learning.

Infrastructure: A mature socio-technical system that has become naturalized in the background. These socio-technical systems have become infrastructures in relation to organized practices.

Infrastructure for learning: An infrastructure for learning is a set of resources and arrangements – social, institutional, technical – that are designed to and / or assigned to support a learning practice.